LAB11: Image Compression

Objectives

Upon completion of this lab, you will be able to:

1. Understand the concept of image compression using Transform coding method.

2. Write a user-defined function in MATLAB for scaling a quantization table using quality factor (QF).

3. Write the program in MATLAB to compress an original sub-image using Discrete Cosine Transform (DCT).

Introduction

Scaled quantization table is griven by :

$$ScFactor = \begin{cases} 1, & QF = 100 \\ 200 - 2*QF, & 50 \leq QF \leq 99 \\ 5000/QF, & 1 \leq QF \leq 49 \end{cases} \tag{1}$$

$$T_{sq} = floor\left[(T_q \times ScFactor + 50)/100\right]$$

where

$ScFactor$ is scaling factor

QF is a quality factor (For the quality factor of 50 as specified in a JPEG Standard quantization table)

T_{sq} is a scaled quantization table

T_q is the JPEG standard quantization table

Exercises

Note that you should create your own function in MATLAB as MATLAB User-defined function. It means that you cannot call MATLAB built-in function, which generates output in the same manner as

your own function. You can use the images provided in the folder **\Google Drive\EGCI486-Image Processing\Second(2015-2016)\LABs\LAB11** for your exercises.

1) Scaled quantization table

   1.1 Write the user-defined function in MATLAB for scaling the quantization table using quality factor, with the following function name: MySQ.m. The quality factors range from 1 (poorest) to 100 (Best Quality). Use the JPEG standard quantization table as shown in Figure 1.

16	11	10	16	24	40	51	61
12	12	14	19	26	58	60	55
14	13	16	24	40	57	69	56
14	17	22	29	51	87	80	62
18	22	37	56	68	109	103	77
24	35	55	64	81	104	113	92
49	64	78	87	103	121	120	101
72	92	95	98	112	100	103	99

Figure 1: JPEG standard quantization table.

2) Transform coding using DCT

   2.1 Write the program in MATLAB to compress an original block using DCT. Take the following program name: ProJPGblock.m. When this program is used with a first 8×8 non-overlapping block of original image, "lena_gray_256.tif", the result as shown in Figure 2.
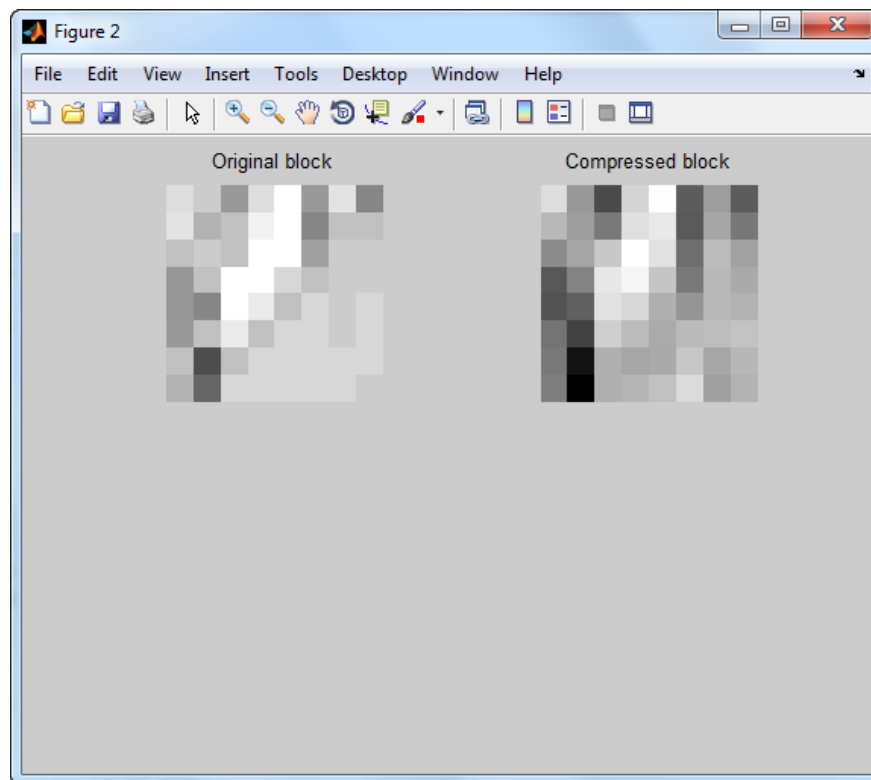
Figure 2: The result of applying image compression on the first original block of original

image using DCT (QF = 80).